

Pelly - Warmbad – Eskom

Bela-Bela Local Municipality, Limpopo Province

Farms: Buffelsdrift 179JR, Kliprand 76JR, Apiesdoring 78JR, Uitvlugt 709JR, Kameelrivier 77JR, Kliprand 74JR,
Haakdoringfontein 85JR

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Palaeontological Impact Assessment

Commissioned by: Texture Environmental Consultants

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B. Executive summary

Outline of the development project: Texture Environmental Consultants has appointed Dr H. Fourie, a palaeontologist, to undertake a Desktop Paleontological Impact Assessment of the proposed Pelly – Warmbad T- OFF Project.

1. Eskom Distribution Limpopo Operating Unit, Land Development plans to construct a 20km 132kV chickadee line (loop out) from Warmbad – Pelly backbone to Rust de Winter Substation in the vicinity of Rust de Winter in the Limpopo Province.

The Eskom Project includes two Alternatives:

- Alternative 1: From the Rust de Winter Substation southwards across the farm Buffelsdrift 179JR, then westward across the farms Kliprand 76JR and Kameelriver 77JR, across Kliprand 74JR southward, and then finally across Haakdongfontein 85JR to the existing Pelly-Warmbad power line.
- Alternative 2: From Rust de Winter Substation southwards across the farm Buffelsdrift 179JR (identical to Alternative 1), then westward across the farm Kliprand 74JR where it joins the existing 132kV Pelly-Warmbad line, and finally southwards across the farm Kliprand 74JR ending at Pelly-Warmbad backbone on Kliprand 76JR.

The National Heritage Resources Act 25 of 1999 requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

This report prescribes to the Heritage Impact Assessment of Section 38 of the National Heritage Resources Act 25 of 1999.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of LOW to VERY HIGH palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act, 1999 (No 25 of 1999):

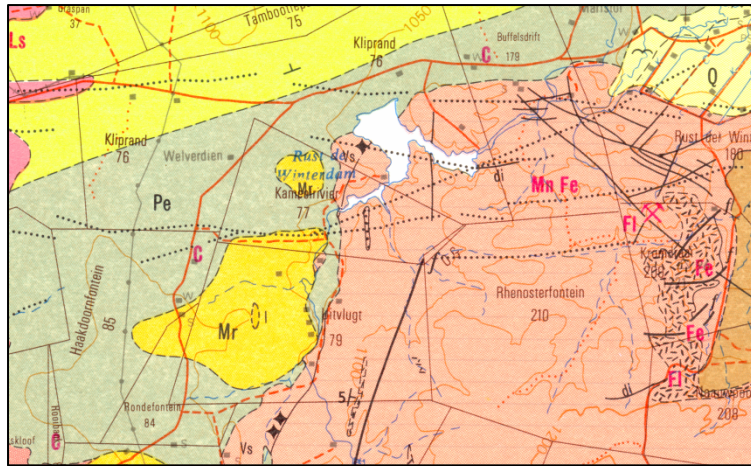
(i) (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.

Section 38, 1(b) requires the details of the construction of a bridge or similar structure exceeding 50m in length.

It is proposed to comment and recommend on the impact of the development on fossil heritage mitigation or conservation necessary.

Outline of the geology and the palaeontology:

The geology was obtained from maps 1:100 000, South Africa and 2528 Pretoria.



Legend to Map and short explanation

- P-R – (green) Shale, sandstone, mudstone, multi-coloured siltstone, and marl. Irrigasië Formation, Karoo Supergroup.
- Pe – (grey) Shale, shaly sandstone, grit, sandstone, conglomerate, and coal. Ecce Group, Karoo Supergroup.
- Mr – (orange) Granophyre. Rashoop Granophyre Suite, Bushveld Complex.
- Vs – (pink) Porphyritic amygdaloidal red rhyolite. Selons River Formation, Rooiberg Group, Transvaal Supergroup.
- Q – (yellow) Quaternary.

Summary of findings: The desktop palaeontological impact assessment was undertaken during August 2013 and the following is reported:

The development is taking place in an area covered by mostly the Ecce Group of the Karoo Supergroup. This section of the Ecce Group has not been subdivided. It is early to mid-Permian in age. The rhyolite belongs to the Selons River Formation, Rooiberg Group top of the Transvaal Supergroup and is Vaalian in age. The pockets of granophyre belong to the Rashoop Granophyre Suite and are intrusive during the Vaalian age. The Irrigasië Formation outcrops in the north of the development and is Trias in age. Most of the development is on Ecce outcrops. The weathered shales to the south of the development close to Hammanskraal have yielded fossil plants.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally MODERATE.

Recommendation:

Alternative 1: From the Rust de Winter Substation southwards across the farm Buffelsdrift 179JR, then westward across the farms Kliprand 76JR and Kameelriver 77JR, across Kliprand 74JR southward, and then finally across Haakdongfontein 85JR to the existing Pelly-Warmbad power line.

The impact of the development on fossil heritage is MODERATE and therefore a field survey or further mitigation or conservation measures may be necessary for alternative 1. The proposed development can go ahead with caution (see Recommendation p7).

Alternative 2: From Rust de Winter Substation southwards across the farm Buffelsdrift 179JR (identical to Alternative 1), then westward across the farm Kliprand 74JR where it joins the existing 132kV Pelly-Warmbad line, and finally southwards across the farm Kliprand 74JR ending at Pelly-Warmbad backbone on Kliprand 76JR.

The impact of the development on fossil heritage is MODERATE and therefore a field survey or further mitigation or conservation measures may be necessary for this development. The proposed development can go ahead with caution (see Recommendation p7).

The clearance of the 31m wide servitude can go ahead.

Stakeholders: Developer – Eskom Distribution Limpopo Operating Unit.
Environmental –Texture Environmental Consultants.

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D. Background information on the project

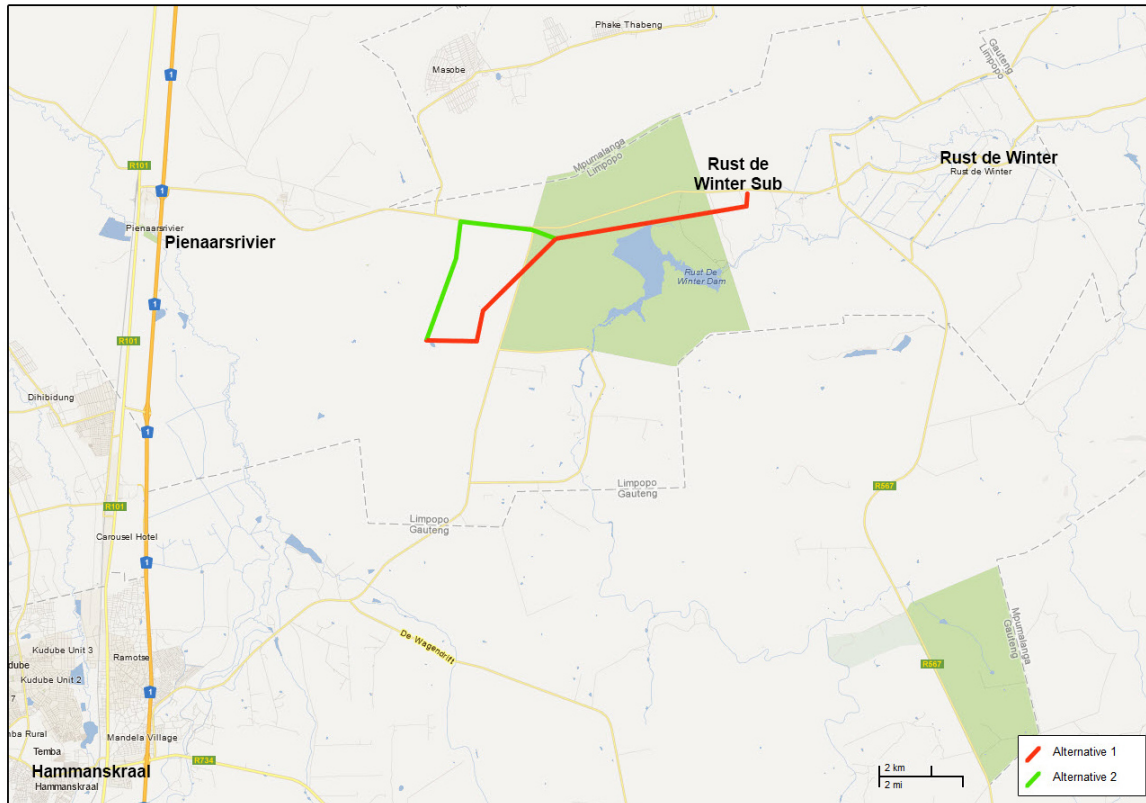
Report

This report is part of the environmental impact assessment process under the NEMA (National Environmental Management Act).

Outline of development

The development is in the Bela-Bela Local Municipality in Limpopo Province. Eskom is currently experiencing the demand for the supply and distribution of additional electricity in the project area. Rust de Winter Substation is presently fed via a radial T-Off from the Warmbad – Pelly 132kV line. Should this line fail, the whole area and Substation will be affected and without power. The current maximum demand is 18MVA and the Substation supplies 11 994 customers with the future load growing to beyond 20 000 customers and demand of 20MA. As part of its assessment of a range of electricity supply options, Eskom is investigating the feasibility of constructing a 20km 132kV chickadee line (loop out) from Warmbad – Pelly 132kV backbone to Rust de Winter Substation.

- Alternative 1: From the Rust de Winter Substation southwards across the farm Buffelsdrift 179JR, then westward across the farms Kliprand 76JR and Kameelriver 77JR, across Kliprand 74JR southward, and then finally across Haakdongfontein 85JR to the existing Pelly-Warmbad power line.
- Alternative 2: From Rust de Winter Substation southwards across the farm Buffelsdrift 179JR (identical to Alternative 1), then westward across the farm Kliprand 74JR where it joins the existing 132kV Pelly-Warmbad line, and finally southwards across the farm Kliprand 74JR ending at Pelly-Warmbad backbone on Kliprand 76JR.



Location Map provided by Texture Environmental Consultants.

Rezoning/ and or subdivision of land: none, Eskom acquires the servitude.

Name of developer and consultant: Eskom and Texture Environmental Consultants.

Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a desktop palaeontological impact assessment to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.

Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Terocephalia. For the past nine years she carried out field work in the Eastern Cape. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 19 years.

Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act no: 25 of 1999. An electronic copy of this report must be supplied to SAHRA.

E. Description of property or affected environment

Location:

The development is in the Bela-Bela Local Municipality in the Limpopo Province north and west of the Rust de Winter dam close to the towns of Pienaarsrivier and Hammanskraal with Rust de Winter is to the east. The affected farms are Buffelsdrift 179JR, Kliprand 76JR, Apiesdoring 78JR (not shown on excerpt of geological map), Uitvlugt 709JR (not shown on map), Kameelrivier 77JR, Kliprand 74JR (shown on map as 76) and Haakdoringfontein 85JR.

F. Description of the Geological Setting

Description of the rock units:

The development is taking place in an area covered by mostly the Ecca Group of the Karoo Supergroup. This section of the Ecca Group has not been subdivided. It is early to mid-Permian in age. The rhyolite belongs to the Selons River Formation, Rooiberg Group of the Transvaal Supergroup and is Vaalian in age and outcrops to the southeast of the development. The

pockets of granophyre belong to the Rашoop Granophyre Suite and are intrusive during the Vaalian age. The Irrigasie Formation is Trias in age.

The name Irrigasie Formation was applied to the succession of predominantly red mudstone lying between the Eccа Group and the Clarens sandstone. This area is known as the Springbok Flats. Interlayered sandstone is present between the red mudstone. Large areas of the southern African continent are covered by the Karoo Supergroup. The largest basin is the area known as the Karoo, but smaller basins are located in the Lebombo area, Springbok flats and Ellisras, and north of the Soutpansberg towards Tshipise-Pafuri and further westward in Namibia. Sediments of the Eccа Group are lacustrine and marine to fluvio-deltaic. The Eccа Group is known for its coal and uranium. The coalfields formed due to the accumulation of plant material in shallow and large swampy deltas (see appendix 1).

The Rooiberg Group is approximately 3000-6000m thick. The Bushveld Complex is the largest layered intrusive body in the world. It consists of three Suites, the Lebowa Granite, the Rашoop Granophyre, and the Rustenburg Layered. An age of 2090Ma is typical for the Rашoop Graphyre Suite.

There are signs of mining past and present (coal, manganese, fluorspar and Iron). The coal is present in the Eccа Group and the manganese, fluorspar and iron is present in the Selons River Formation. Kimberlite pipes as well as diabase dykes are prevalent in the Selons River Formation.

- Alternative 1: From the Rust de Winter Substation southwards across the farm Buffelsdrift 179JR, then westward across the farms Kliprand 76JR present on Eccа sediments and Kameelriver 77JR with the two domes of Rашoop granophyre, across Kliprand 74JR southward on Eccа sediments with some red mudstones of the Irrigasie Formation, and then finally across Haakdongfontein 85JR to the existing Pelly-Warmbad power line.
- Alternative 2: From Rust de Winter Substation southwards across the farm Buffelsdrift 179JR (identical to Alternative 1), then westward across the farm Kliprand 74JR where it joins the existing 132kV Pelly-Warmbad line, and finally southwards across the farm Kliprand 74JR ending at Pelly-Warmbad backbone on Kliprand 76JR.

G. Background to Palaeontology of the area

Summary: When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desk top and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally MODERATE.

Rock Unit	Significance/vulnerability	Recommended Action
Ecca Group (Pr, Pf, Pwa, Pe)	Moderate	Desk top study

The Eccа Group may contain fossils of diverse non-marine trace fossils, *Glossopteris* flora, mesosaurid reptiles, palaeoniscid fish, marine invertebrates, insects, and crustaceans. Sediments are Early-mid Permian in age and non-marine lacustrine. The weathered shales at Hammanskraal to the south have yielded plant fossils.

The weathered shales at Hammanskraal to the south have yielded plant fossils.

Databases and collections: Ditsong: National Museum of Natural History.

Impact: MODERATE. There may be some significant fossil resources that may be impacted by the development.

H. Description of the Methodology

The desktop palaeontological impact assessment scope was undertaken during August 2013.

Assumptions and Limitations:-

The accuracy and reliability of the report is limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.

2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.
5. A site visit was not conducted.
6. The Palaeontological Heritage Technical Reports for the Limpopo Province has not been done.

I. Description of significant fossil occurrences

All Karoo Supergroup geological formations are ranked as LOW to VERY HIGH, therefore the possible impact is potentially MODERATE for the Eccca sediments and for the Bushveld Complex and Transvaal Supergroup ZERO.

J. Recommendation

- a. There is no objection to the development of the construction of the Eskom Project. It may be necessary to request a Phase 1 Palaeontological Impact Assessment to determine whether the planting of pylons will affect fossiliferous outcrops as the palaeontological sensitivity is MODERATE. A Phase 2 Palaeontological Mitigation will only be required if during excavation of the development comes across fossiliferous outcrops.
- b. This project will benefit the townships, the growth of the community and social development in general.
- c. Preferred choice: Both alternatives are viable as their impact on the palaeontological heritage are equal.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures.

Sampling and collecting:

Wherefore a permit is needed from the South African Heritage Resources Agency (SAHRA).

- a. Objections: None.
- b. Conditions of development: See Recommendation.
- c. Areas that may need a permit: Eccca sediments of the Karoo Supergroup.
- d. Permits for mitigation: Needed from SAHRA.

K. Conclusions

- a. All the land involved in the development was assessed and none of the property is unsuitable for development.
- b. All information needed for the Desktop Palaeontological Impact Assessment and scope was provided by Texture Environmental Consultants, Ms R. Pretorius.
- c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures. Especially shallow caves.
- e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment and adjacent areas as well as for safety and security reasons.

L. Bibliography

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Declaration

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological scope. There are no circumstances that compromise the objectivity of me performing such work.

Heidi Fourie accepts no liability, and the client, by receiving this document, indemnifies Heidi Fourie against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.



Heidi Fourie
2013/08/26

Appendix 1: Some examples of fossils of the Ecca Group.

Ecca Group

Vryheid Formation

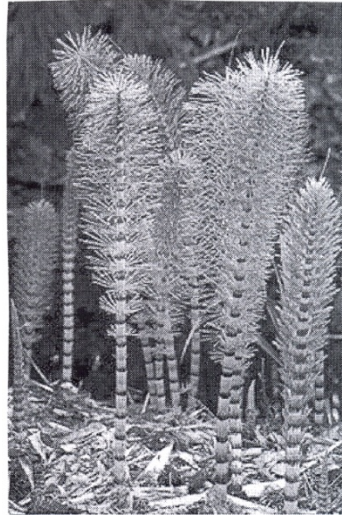
Glossopteris



Ferns



Horsetails



Clubmosses

